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# Results of Water Testing

## National Swine Survey

Water -- one of a pig's most important needs. And often an overlooked reason for poor productivity and performance among hogs.

Because poor performance and productivity may be connected to high sulfate and nitrate consumption, the National Animal Health Monitoring System (NAHMS) undertook a water study involving 692 producers who submitted water samples from their farrowing facilities for testing. The samples -- two collected from the same source about three months apart for seasonal differences -- were checked for salt content, hardness, and concentration of nitrate.

Compounds and elements involved in the water quality study included nitrate, nitrite, barium, fluoride, chloride, sulfate, sodium, potassium, calcium, magnesium, ammonia, bromide, lithium, zinc, phosphate, and iron.

Because no animal guidelines exist, NAHMS utilized the Environmental Protection Agency's (EPA's) human consumption quality standards. And, according to these standards, National estimates from the study show that nearly 15 percent of swine water supplies contained high nitrate levels. Less than 2 percent showed nitrite or barium levels above the standard. Fluoride levels were greater than the EPA levels in less than one-half of 1 percent of the swine water supplies.

None of the other compounds or elements have EPA standards for comparison.<sup>1</sup>

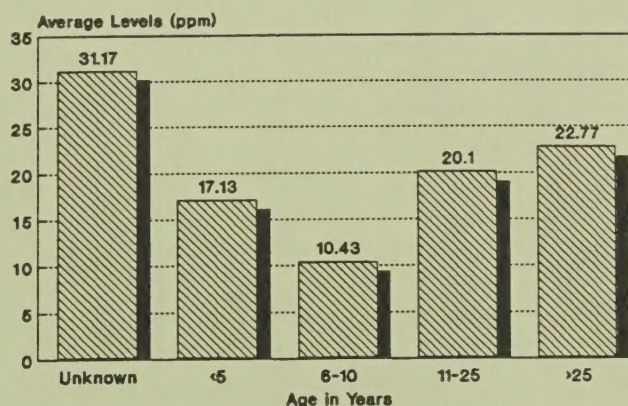
Two phases of analysis have been undertaken: first, to describe the existing levels (contained in this article) and second, to associate high levels with productivity (analysis yet to be completed). In this description, nondetectable levels were included in the analysis as "0."

Slightly more than 85 percent of the swine producers used wells as their operation's primary water source. The remaining 15 percent of producers relied on: ponds/lakes, 3 percent; rural water, 5 percent; city water, 4 percent; other, 2 percent; and rivers/creeks, less than 1 percent.

Wells of unknown age proved the key source with the highest concentration of nitrate.

Figure 1.

Nitrate Levels\* by Age of Well



\*Human health limit for nitrate set by the Environmental Protection Agency (EPA) = 45.0 ppm.

<sup>1</sup>Some researchers have proposed levels for livestock. Reference: Osweiler, G.D., Carson, T.L., et al. *Clinical and Diagnostic Veterinary Toxicology*, 3rd edition. (Dubuque: Kendall/Hunt Publishing Company, 1985.)



"We believe that the age of wells is unknown because the wells have been on the place longer than the producers," said Dr. Tim Loula of the Association of American Swine Practitioners and a NAHMS Advisory Group member. "And these older, unknown wells are the ones with the higher levels of nitrate."

"Thus, we think the older the well, the more likely it is for the water to contain more nitrate."

The NAHMS study also shows that concentrations of nitrate in wells less than 5 years old were higher than that in wells in the 6- to 10-year category. However, concentrations of nitrate increased again in wells 11 to 25 years in age and those older than 25 years.

"What this says is that no matter what the age of your well, check it," Loula inserts. "Any well can be suspect."

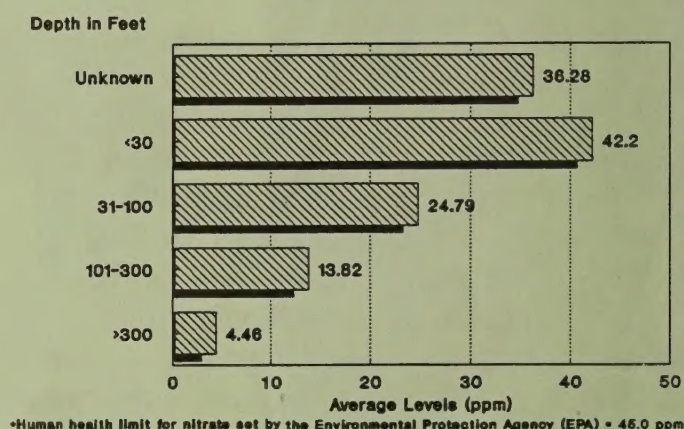
The older wells, or wells of unknown age, are more likely to be shallow wells. Depths of wells and levels of compounds and elements

were also compared in this study. In wells of 30 feet or less, the concentration of nitrate came close to the EPA's limit of 45.0 parts per million (ppm). As the wells deepened, nitrate concentrations lessened.

None of the other three elements -- nitrite, fluoride and barium -- showed increases by age of well or depth of well. Barium, however, gave evidence to a decrease, from a high of .19 ppm in wells 31-100 feet deep to a low of .03 ppm in those deeper than 300 feet.

Figure 2.

Nitrate Levels\* by Depth of Well



The National Swine Survey was a cooperative effort of State agricultural departments; universities; and the following USDA agencies: Extension Service (ES), National Agricultural Statistics Service (NASS), and Animal and Plant Health Inspection Service (APHIS). The study of swine health and productivity was conducted from December 1989 through January 1991. The objectives were to provide information on the production and health levels of the United States' swine herd, and to suggest factors that may affect preweaning morbidity and mortality.

A statistical sample of producers from 18 States was selected to provide inferences about the nation's hog population. The resulting estimates represent 95 percent of the United States' swine population.

The National Agricultural Statistics Service (NASS) selected the sample and collected retrospective data on swine health and management practices from 1,661 farms.

Seven hundred and twelve (712) producers agreed to continue providing data to State and federal Veterinary Medical Officers (VMO's). Each farm was visited a total of four times over a 90- to 120-day period. Data collection instruments such as diary cards were implemented to collect prospective data on the farrowing to weaning stage of swine production. The producers recorded observations of clinical signs associated with illness and death in sows, gilts, and preweaning piglets.

Specimen analyses for the National Swine Survey were performed by the National Veterinary Services Laboratories (NVSL) in Ames, Iowa.

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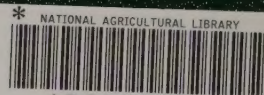


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